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Indian Standard

METHODS OF TEST FOR CORRUGATED FIBREBOARD

PART III WATER RESISTANCE OF GLUE BOND BY IMMERSION

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Indian Standard

METHODS OF TEST FOR CORRUGATED FIBREBOARD

PART III WATER RESISTANCE OF GLUE BOND BY IMMERSION

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Indian Standard

METHODS OF TEST FOR CORRUGATED FIBREBOARD

PART III WATER RESISTANCE OF GLUE BOND BY IMMERSION

0. FOREWORD

0.1 This Indian Standard (Part III) was adopted by the Indian Standards Institution on 29 July 1976, after the draft finalized by the Paper and Flexible Packaging Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 The increasing use of corrugated fibreboard for transport containers has given an impetus to this industry for expansion. The growing demand for this product has brought to the fore the need of evaluating the various physical characteristics of the corrugated fibreboard. The standards on test methods for these characteristics have been covered in the following parts for proper evaluation and reproducibility of test results under different conditions:

IS : 7063 (Part I)-1973 Methods of test for corrugated fibreboard: Part I Thickness of board

IS : 7063 (Part II)-1976 Methods of test for corrugated fibreboard: Part II Edgewise crush resistance of board

IS : 7063 (Part III)-1976 Methods of test for corrugated fibreboard: Part III Water resistance of the glue bond by immersion

IS : 7063 (Part IV)-1976 Methods of test for corrugated fibreboard: Part IV Determination of substance of the component papers after separation

0.3 This method evaluates the water resistance of the glue bond of corrugated fibreboard fabricated with water-resistant adhesives. For international co-ordination and recognition, this standard has been based on ISO 3038-1975 ‘ Corrugated fibreboard — Determination of the water resistance of the glue bond by immersion ’, issued by the International Organization for Standardization.

0.4 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part III) specifies the apparatus and the test procedure for determining the water resistance of the glue bond of corrugated fibreboard by immersion.

1.1.1 This test method is applicable to all types of corrugated fibreboard in which a high degree of bond strength is required to resist the influence of wet conditions.

2. PRINCIPLE

2.1 The length of time during which a predetermined combination of glue lines, immersed in water, resists the pull of a suspended weight in the plane vertical axis of the corrugated fibreboard, at a right angle to the glue lines is measured.

3. APPARATUS

3.1 Water Tank — Preferably made of glass for easy observation, large enough for free suspension of the required number of test pieces and having a depth of not less than 250 mm. The bottom of the glass tank may be lined with a rubber sheet to prevent damage.

3.2 Suspension Device — Rods or bars, with hooks, placed across the tank for suspension of test pieces. The hooks may be numbered or coded for identification of test pieces.

3.3 Rubber Stamp — Soft rubber stamp, with an inking device to mark the sample of corrugated fibreboard with outlines and other details for cutting the test pieces. The design to be imprinted on the corrugated fibreboard is shown in Fig. 1.

3.4 Weight — Piece of copper, fitted with a hook or a gripper, having total mass of 250·0 ± 1·0 g per test piece. A piece of different metal may be used provided that corrections are made to the hydrostatic weight.

3.5 Auxiliary Equipment — Other auxiliary items required for the test are the following:

a) Knife with a sharp thin blade,
b) Straight edge,
c) Punch plier,
d) Eyelet plier and eyelets, and
e) Pressure sensitive adhesive tape, 20 to 30 mm wide, and resistant to water under the conditions of test.

4. SAMPLING AND PREPARATION OF TEST PIECES

4.1 Sampling — Representative samples for this tests hall be drawn as prescribed in 3 of IS : 1060 (Part I)-1966*.

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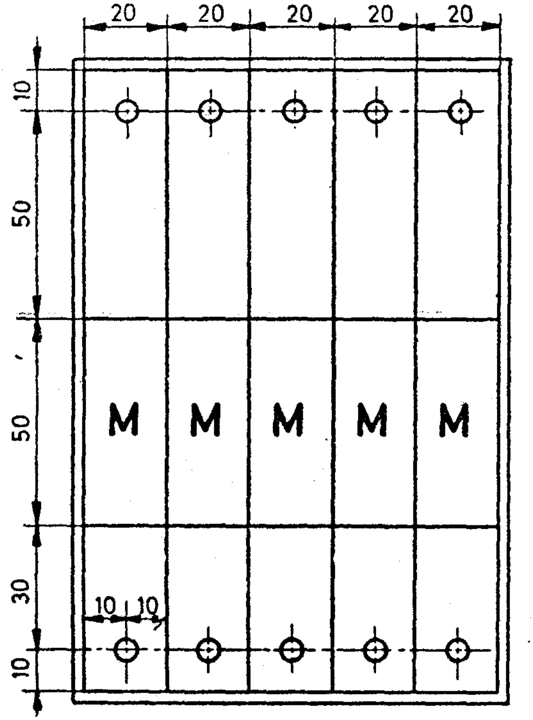
*Methods of sampling and test for paper and allied products: Part I (*revised*).

4.1.1 The corrugated fibreboard from which samples are to be drawn shall be at least 3 days old to allow it to develop its water-resistance properties.



All dimensions in millimetres.

FIG. 1 RUBBER STAMP FOR MARKING OUT FIVE TEST PIECES

4.1.2 Individual sample shall be large enough to permit cutting of five test pieces of 20 ± 1 mm by 150 mm with the flutes at right angles to the length of the test piece.

4.2 Preparation of Test Pieces — Mark at least five samples of the corrugated fibreboard with the rubber stamp and cut five test pieces, taking care not to damage the glue bond.

4.2.1 Reinforce the lower end of each test piece by winding pressure sensitive tape around it.

4.2.2 Punch two holes in the test piece, their centres being at a distance of 10 mm from ends and side. Insert eyelets into these holes and clench them.

4.2.3 Suspend the test pieces from the rod by a suitable clamp. A copper clamp may be used at the lower end to suspend the weight. This clamp and any additional copper weight shall have a total mass of 250 ± 1 g (*see* **3.4** *and* Fig. 2).

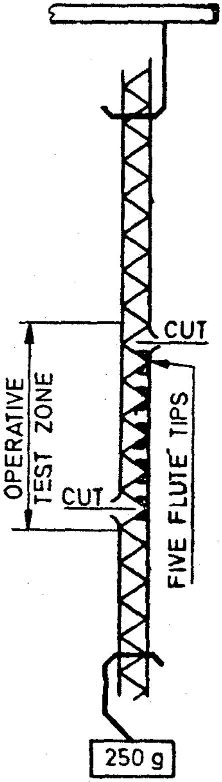


FIG. 2 SUSPENSION ARRANGEMENT AND TYPICAL CUTS IN SINGLE-WALL BOARD

5. PROCEDURE

5.1 Determination of Glue Lines

5.1.1 As shown in Fig. 1 the five glue lines to be tested are located in zone *M* on which shearing stress is concentrated.

5.1.2 Isolate these glue lines by such cuts through the components as may be necessary to achieve this object (*see* Fig. 3).

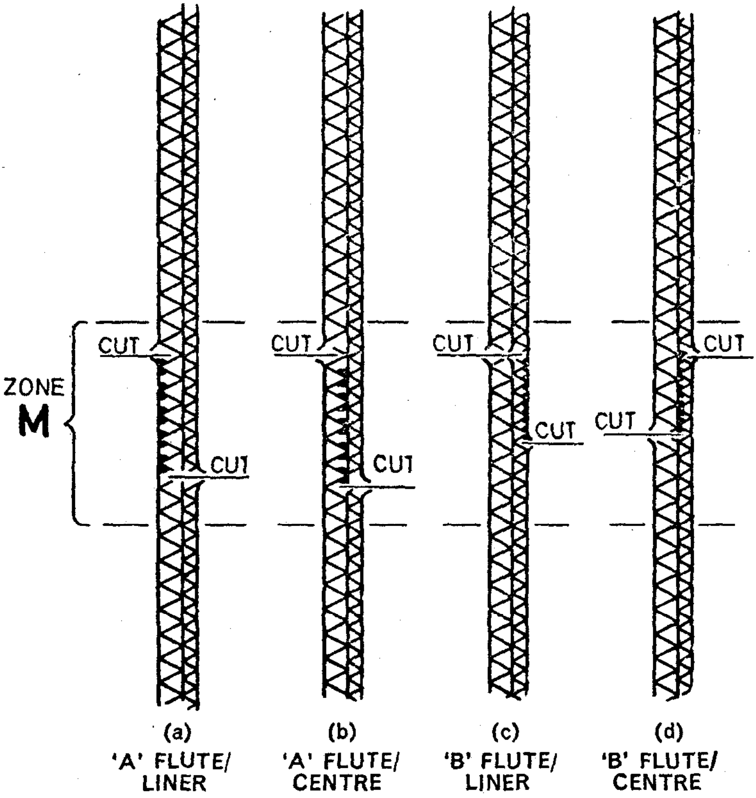


FIG. 3 TYPICAL CUTS IN DOUBLE-WALL BOARD TO ISOLATE THE FIVE GLUE LINES TO BE TESTED

5.2 Immersion — Suspend at least five test pieces, duly coded or numbered for identification, with their reinforced ends loaded with weights, in the tank filled with distilled water at 27 ± 2°C, ensuring that all *M* zones (*see* **5.1.1**) of the test pieces remain immersed 25 mm below the surface of the water during test period.

5.2.1 Individual test pieces shall not be used to test more than one set of five glue lines between the selected liner and its fluting. Care shall also be taken to avoid the inclusion of air bubbles in the flutes.

5.3 Check the immersed test pieces for failure at intervals of 24 h.

5.3.1 Failure is indicated by complete separation of the five bonds, which will cause the weight to drop. An automatic system may also be used that allows to indicate the moment of rupture (drop of the weight).

5.4 Repeat the procedure with the remaining test pieces.

6. TEST RESULT

6.1 Express the water resistance of the glue bond of a test piece by the duration, in hours, corresponding to the moment or the interval at which the rupture is noted.

7. TEST REPORT

7.1 The test report shall include the following particulars:

a) Date and place of testing;

b) Description and identification of the product tested;

c) Identification of each sample tested;

d) Number of test pieces;

e) Number of failures at the chosen, test interval, indicating the interval between the observations. If automatic timing is used, the time of failure for each test piece shall be stated;

f) A statement whether after rupture:

  1) Fibres adhere to the glue, and

  2) Glue predominates on the fibre surface.

g) Any other information that may assist in the interpretation of the test results.

7.1.1 The test report may also give reference to this Indian Standard.

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